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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

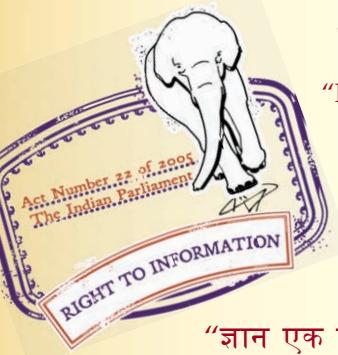
“Step Out From the Old to the New”

IS 11014-2 (1984): Piezoelectric Ceramic Materials, Part 2: Types 1 and 5 [LITD 5: Semiconductor and Other Electronic Components and Devices]

“ज्ञान से एक नये भारत का निर्माण”

Satyanareshwaran Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartṛhari—Nītiśākām

“Knowledge is such a treasure which cannot be stolen”





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Indian Standard



## SPECIFICATION FOR PIEZOELECTRIC CERAMIC MATERIALS

### PART 2 TYPES 1 AND 5

**0. General** — This standard (Part 2) shall be read in conjunction with IS : 11014 (Part 1)-1984 'Specification for piezoelectric ceramic materials: Part 1 General aspects and methods of measurements'.

**1. Type Designation** — See 3 of IS : 11014 (Part 1)-1984.

**1.1 Type 1** — Modified barium titanate materials having relatively high frequency constant ( $N_s t$ ) and suitable for low signal application.

**1.2 Type 5** — Modified lead zirconate titanate materials having high planar coupling coefficient ( $k_p$ ) and suitable for general purpose low signal application, for example ultrasonic transducers.

**2. Test Specimens** — In general, practical dimensions used in ceramic elements may not be suitable for the measurement of many parameters. To determine these parameters accurately, it is essential to have test specimen of three different configurations as follows:

- a)  $l \geq 2.5 w, t, D$  or
- b)  $l \geq 3.5 w, t$  or
- c)  $D \geq 10 t$

where

$l$  = length,  $w$  = width,  $t$  = thickness, and  $D$  = diameter of the disc.

**3. Parameters** — See Table 1 below:

TABLE 1 PARAMETERS WITH TOLERANCE FOR PIEZOELECTRIC CERAMIC MATERIALS  
TYPES 1 AND 5

Sl. No.	Parameters	Symbols	Piezoelectric Materials Types		
			Type 1	Type 5	Tolerance
(1)	(2)	(3)	(4)	(5)	(6)
					Percent
I)	Density (M/m) ( $10^3$ kg/m <sup>3</sup> )	$d$	5.6	7.6	—
II)	Dielectric constant	$K_s^T$	1300	1700	20
III)	Dissipation factor (Max)	$\tan \delta$	$\geq 0.025$	$\geq 0.025$	—
iv)	Resistivity ( $\Omega$ cm)	$\rho$	$\geq 10^{12}$	$\geq 10^{13}$	—
v)	Planer coupling coefficient	$K_p$	0.33	0.55	$\pm 5$
vi)	Piezoelectric charge constant $\times 10^{-18}$ C/N	$d_{33}$	2145	350	$\pm 10$
vii)	Piezoelectric voltage constant $\times 10^{-8}$ — m/N	$g_{33}$	12.7	24	$\pm 10$
viii)	Frequency constant (Hz)	$N_s t$	2700	1900	$\pm 10$
ix)	Mechanical quality factor	$Q_m$	200	85	$\pm 10$
x)	Curie temperature (°C)	$\theta_c$	120	280	—

Adopted 28 September 1984

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